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**Sprint PCS\***

1801 K Street N.W.  
Suite M112  
Washington, DC 20006

Telephone: 202 835 3616  
Fax: 202 835 2092

July 30, 1999

**VIA HAND DELIVERY**

Magalie Roman Salas  
Secretary  
Federal Communications Commission  
1919 M Street, N.W.  
Room 222  
Washington, D.C. 20554

JUL 30 1999

**Re: *Ex Parte* Notification: Revisions of the Commission's Rules To Ensure  
Compatibility with Enhanced 911 Emergency Calling Systems,  
CC Docket No. 94-102/DA 99-1049**

Dear Ms. Salas:

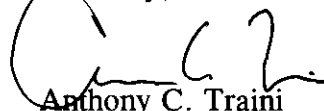
Sprint PCS ("Sprint") hereby files an original and two copies of a notification of an *ex parte* contact in CC Docket No. 94-102, DA 99-1049.

Jonathan Chambers and Terry Rayburn of Sprint, Jonas Neihardt of Qualcomm, and Susan McNeil, Janine O'Shea, Chris Fernandez, Robert Richton, and Ibrahim Tekin of Lucent Technologies met with Thomas Sugrue, Chief of the Wireless Telecommunications Bureau, Daniel Grosch, Martin Leibman, Kris Montieth, and Ronald Netro of the Wireless Bureau to discuss enhanced 911 location technologies.

A copy of Lucent's presentation is attached.

Please contact the undersigned with any questions

Sincerely,

  
Anthony C. Traini  
Legal Analyst

Attachments  
cc: Thomas Sugrue

No. of Copies rec'd 0 + 2  
List ABCDE

# **Lucent Location Technology**

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**Chris Fernandez, AMPS/PCS Product Management**

**Robert Richton, Wireless Technology Laboratory**

**Ibrahim Tekin, Wireless Technology Laboratory**

**July 29, 1999**

Lucent Technologies Proprietary

**Lucent Technologies**  
Bell Labs Innovations



# OUTLINE

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- Introduction - Location Technology
- Technology Status
- Lucent Plans
- EFLT
- WAG
- Summary



# Introduction - Types of Location Technologies

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- **Two broad technology types**
  - **Network-Based**
    - Works with existing mobiles
    - Level of accuracy bound by theoretical limits
  - **Handset-Based**
    - Requires modified handsets with/without network assistance
    - Potential for relatively higher level of accuracy than network-based solutions



# Technology Status

	CDMA	TDMA	AMPS
Legacy Mobiles	Network Based Solution (EFLT) investigated	Multiple vendors claim Network Based Solutions	Multiple vendors claim Network Based Solutions
New/ Modified Mobiles	GPS/Hybrid* technology being investigated	GPS /Hybrid* technology being investigated	Dual Mode Technology

\* Hybrid element (AFLT) can support modified legacy CDMA handsets

☐ Indicates Lucent location product development focus

☐ Provide open interface



# Lucent Plans

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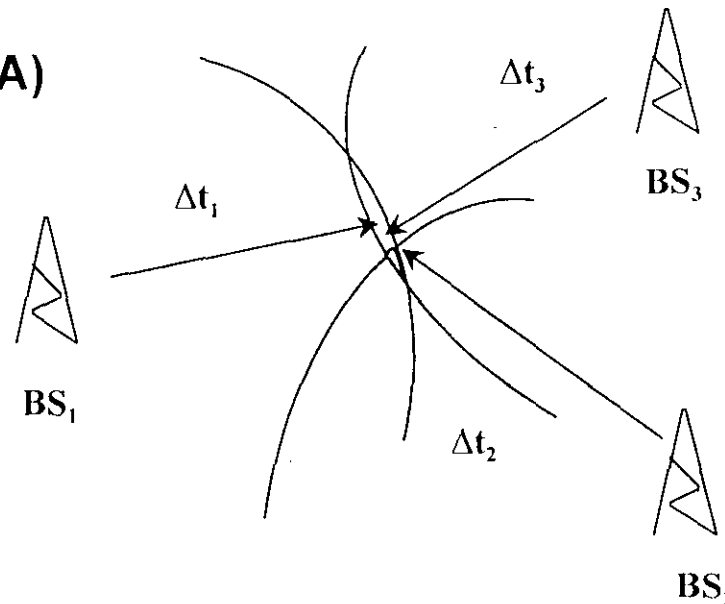
- Provide an open interface so service providers have choice and access to 3rd party location solutions
- Develop Wireless Assisted GPS
- Revisit decision to develop solution for CDMA legacy coverage based on FCC response to waiver petitions



# E-FLT - A Network-based technology for CDMA

## Legacy mobiles

- Primary method based on Time Difference of Arrival (TDOA) using forward-link signals (PN offsets) reported by mobiles
- Enhanced by complementary methods:
  - Round trip delay
  - Limited Angle of Arrival (AOA)



# EFLT Technology Trial Environment

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- **Sprint - Kansas City Trial**
  - Relatively flat terrain
  - No high rise buildings (mostly 2 story)
  - Data gathered in a lab environment
  - Driving speeds at 25 MPH or less
- **Bell Atlantic Mobile (BAM) New Jersey Highway**
  - Relatively flat terrain
  - No high rise buildings
  - Data gathered in a live environment
  - Driving speeds at 55 MPH
- **Bell Atlantic Mobile (BAM) Indoors**
  - Lucent Whippany buildings with metal frames and window shields
  - Data gathered in a live environment
  - Stationary





# EFLT Trial Results

<b>Trial Site</b>	<b>RMS @ 100%</b>	<b>RMS @ 67%</b>	<b>% &lt;125 m</b>
<b>Sprint Labs</b>	261 meters	230 meters	35%
<b>BAM Indoor</b>	306 meters	245 meters	41%
<b>BAM Highway</b>	433 meters	410 meters	10%

- Location accuracy obtained with no change to system parameters
- Software at BS/MSR needs to be enhanced for this solution
- These findings are representative of the situations under which the trial was conducted
- More trials will be needed to determine solution viability under various conditions



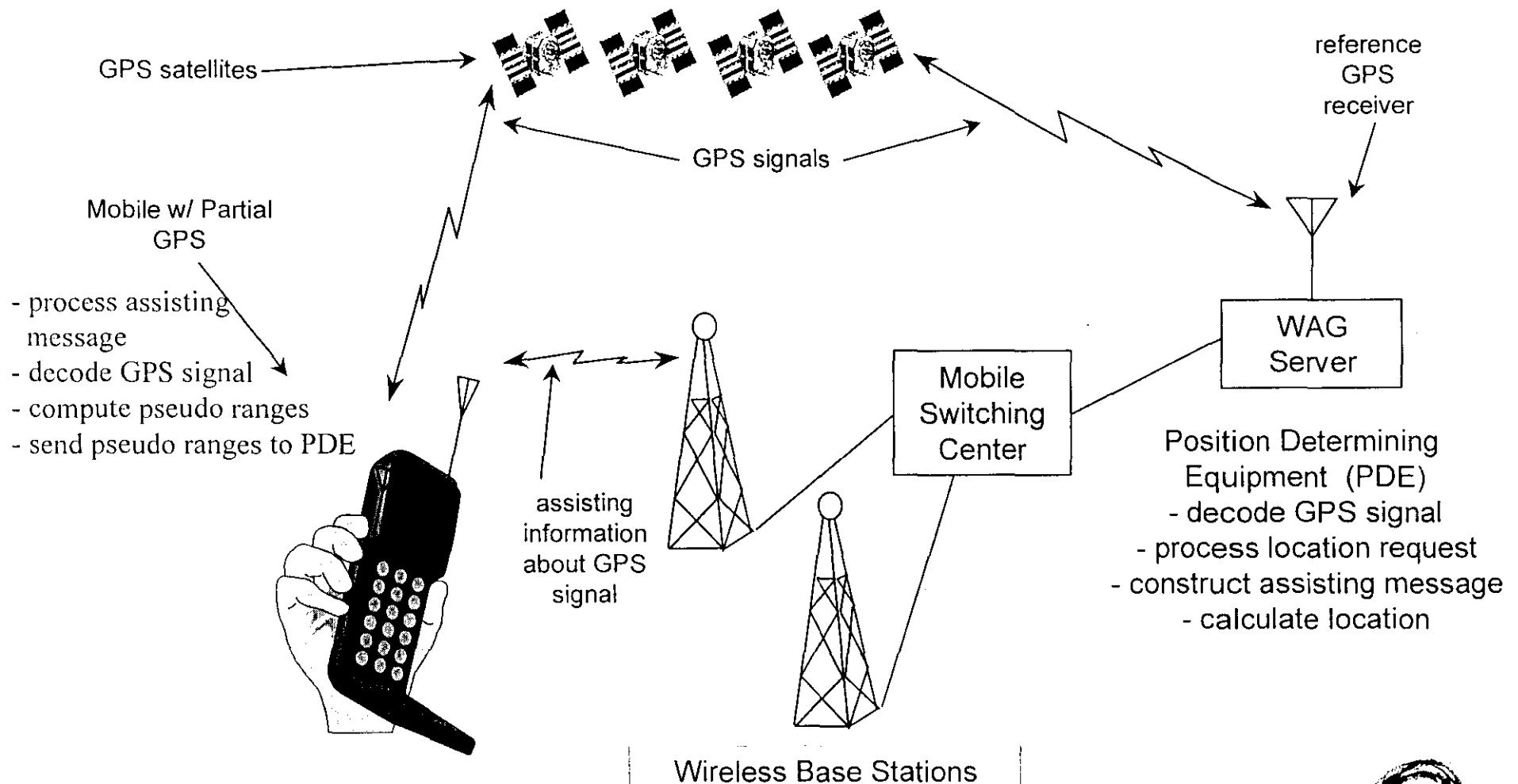
# What is WAG?

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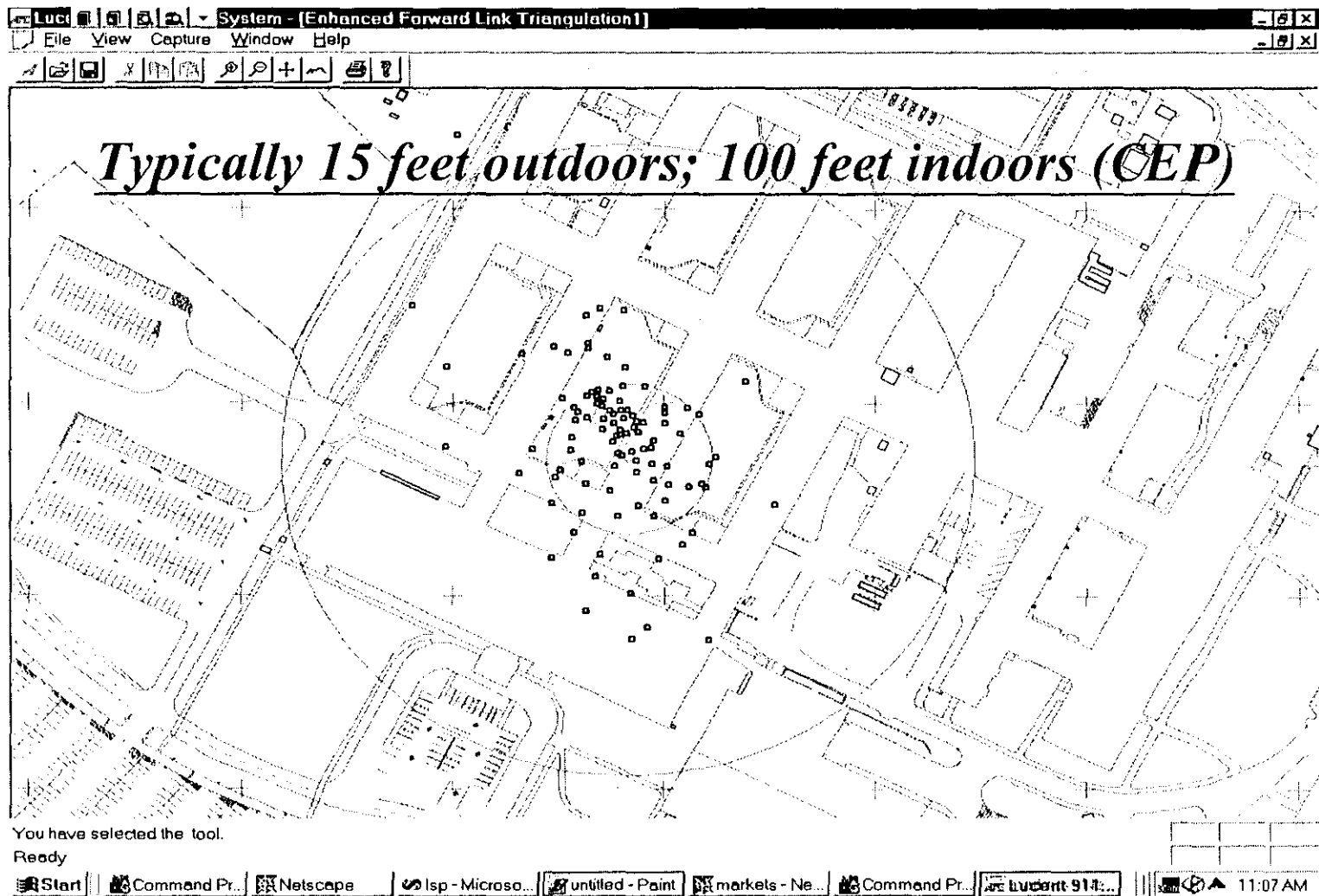
- **Wireless Assisted GPS (WAG)**
  - Incorporate partial GPS functions in cellular handset
  - Cellular network provides timing reference to handset
  - Cellular network provides GPS satellite information to handset per rough estimate of mobile location
  - Mobile can return raw data to the network
  - Mobile's location can then be efficiently derived



# Wireless-Assisted GPS (WAG)



# WAG Lab Test - Whippany Campus



# WAG Status

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- Technology announced by Lucent (June 1999)
- Lucent/Qualcomm joint development agreement (July 1999)
  - Trial expected this autumn
- Standards moving quickly
  - TR45.5 (CDMA) baselined PN4535 standard supporting assisted GPS messaging; Ballot Text expected August 16
  - The standard is suitable for IS-136 as well; TR45.3 (TDMA) has discussed similar assisted GPS techniques
  - The standard could enable IS-136, IS-95 compatibility (roaming in AMPS modes on cellular systems)



# Summary

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- **EFLT**
  - It appears unlikely that the technology tested will achieve a 125 meter RMS as required by the FCC E911 Phase II Mandate
- **WAG**
  - Presently working with Qualcomm to conduct technology prototype testing and technology trials
- **Open Interface**
  - Provide open interface so service providers have access to 3rd party vendor solutions

